



6. B.Sc. (Ag) THIRD YEAR SECOND SEMESTER

6.1 Production Economics and Farm Management [AEC 302]

2 (1+1)

Theory:

Production Economics: Meaning, Definition, Nature and Scope of Agricultural Production Economics. Basic concepts and terms. Concepts of Production. Production Functions: Meaning, Definition, Types. Laws of returns: Increasing, Constant and decreasing. Factor Product Relationship. Determination of optimum input and output. Factor relationship. Product relationship. Types of enterprise relationships. Returns to scale: Meaning, Definition, Importance. Farm Management. Economic principles applied to the Organizations of farm business. Types and systems of farming. Farm planning and budgeting. Risk and uncertainty. Farm budgeting. Linear programming: Assumptions, Advantages and Limitations of Linear programming.

Practical:

1. Computation of cost concepts;
2. Methods of computation of depreciation;
3. Analysis of Net worth statement;
4. Farm inventory analysis; Preparation of farm plans and budgets;
5. Types of farm records and accounts;
6. Preparation of profit and loss account;
7. Break, Even analysis;
8. Economics analysis of different crop and livestock enterprises;
9. Application of Farm Management Principles.

References:

1. S.S. Johl and T.R. Kapur (1977). Fundamentals of Farm Business Management, Kalyani Publishers, Ludhiana.
2. C.A. Robertson (1980). Introduction to Agricultural Production Economics and Farm Management University of Delhi, Delhi.
3. I.J. Singh (1977). Elements of Farm Management Economics, East-West Press (P) Limited, New Delhi.



4. V.T. Raju and D.V. S. Rao (1993). Economics of Farm Production and Management, Oxford & IBH, New Delhi.

6.2 Extension Methodologies for Transfer of Agricultural Technology [EXT 302] 2(1+1)

Theory:

Communication – Meaning, Definition, Models, Elements and their Characteristics, Types and Barriers in communication. Extension Programme Planning – Meaning, Definitions of Planning, Programme Project Importance, Principles and Steps in Programme Development Process, Monitoring and Evaluation of Extension Programmes. Extension Teaching methods – Meaning, Definition, Functions and Classification. Individual contact methods – Farm and Home visit, Result Demonstration, Field trials – Meaning, Objectives, Steps, Merits and Demerits. Group contact methods – Group discussion, Method demonstration, Field Trips – Meaning, Objectives, Steps, Merits and Demerits. Small group discussion techniques – Lecture, Symposium, Panel, Debate, Forum, Buzz group, Workshop, Brain Storming, Seminar and Conference. Mass contact Methods – Campaign, Exhibition, Kisan Mela, Radio & Television – Meaning, Importance, Steps, Merits & Demerits. Factors influencing in selection of Extension Teaching Methods and Combination (Media Mix) of Teaching methods. Innovative Information sources – Internet, Cyber Cafes, Video and Tele conferences, Kisan call centers, Consultancy clinics. Agricultural Journalism – Meaning, Scope and Importance, Sources of news, Types, Merits and Limitations. Diffusion and Adoption of Innovations – Meaning, Definition, Models of adoption Process, Innovation – Decision Process – Elements, Adopter categories and their characteristics, Factors influencing adoption process. Capacity building of Extension Personnel and Farmers – Meaning, Definition, Types of training, Training to farmers, farm women and Rural youth – FTC and KVK.

Practical:

1. Simulated exercises on communication.
2. Identifying the Problems, Fixing the Priorities and selecting a most important problem for preparation of a project.
3. Developing a project based on identified problems in a selected village.
4. Organization of Group discussion and Method demonstration.
5. Visit to KVK / FTC.
6. Planning and Writing of scripts for Radio and Television.



7. Audio Visual aids – Meaning, Importance and Classification.
8. Selection, Planning, Preparation, Evaluation and Presentation of visual aids.
9. Planning & Preparation of visual aids – Charts, Posters, Over Head Projector, (OHP) Transparencies, Power Point Slides.
10. Planning and Preparation of Agricultural Information materials – Leaflet, Folder, Pamphlet, News Stories, Success Stories.
11. Handling of Public Address Equipment (PAE) System, Still camera, Video Camera and Liquid Crystal Display (LCD) Projector.

References:

1. Adivi Reddy A., (2001). Extension Education, Sree Laxmi Press, Bapatla, A.P.
2. Ray GL., (1999). Extension Communication and Management, Noya Prakash, Calcutta, West Bengal.
3. Sandhu AS, (2000). Extension Programme Planning, Oxford and IBH Publications, New Delhi.
4. Rogers EM (1995). Diffusion of Innovations, The Free Press New York.

6.3 Biochemistry [BCH 301]**3(2+1)****Theory:**

Biochemistry – Introduction and importance. Plant cell, cell wall and its role in live stock, food and paper industries. Bio-molecules – Structure, properties & applications: Amino acids, peptides and proteins –Plant proteins and their quality. Enzymes –Factors affecting the activity, classification, Immobilisation and other industrial applications. Lipids –Acyl lipids, Their industrial application in soaps, detergents, paints, Varnishes, lubricants, adhesives, plastics, nylon, Bio-diesel, Biodegradable plastics etc. Carbohydrates; Nucleotides and Nucleic acids. Metabolic energy and its generation – Metabolism – Basic concepts, Glycolysis, Citric acid Cycle, Pentose phosphate pathway, oxidative phosphorylation, Fatty acid oxidation. General reactions of amino acid degradation. Biosynthesis – carbohydrates, Lipids, Proteins and



Nucleic acids. Metabolic regulation. Secondary metabolites, Terpenoids, Alkaloids, Phenolics and their applications in food and pharmaceutical industries.

Practical:

1. Amino acid models (atomic);
2. Paper electrophoresis for the separation of plant pigments;
3. Protein denaturation – heat, pH, precipitation of proteins with heavy metals, Protein estimation by Lowry method;
4. Enzyme kinetics, competitive inhibition, enzyme immobilization;
5. Extraction of nucleic acids, column chromatography of RNA hydrolysate;
6. Characterization of lipids by T.L.C.;
7. Extraction of oil from oil seeds;
8. Estimation of fatty acids by G.L.C.;
9. Models of sugars, sucrose & starch; Quantitative determination of sugars;
10. Paper chromatography for the separation of sugars;
11. Determination of phenols.

References:

1. Biochemistry by U. Satyanarayan and U. Chakrapani. Arunabha Sen Books & Allied Pvt. Ltd.
2. Outlines of Biochemistry by Eric E. Conn and Paul K Stumpf and others. WSE: Wiley India Pvt. Ltd.
3. Fundamentals of Biochemistry by J.L. Jain.S. Chand and Co. Ltd.
4. Biochemistry by Dulsy Fatima, L.M. Narayan and others. Saras Publications.
5. A text book of Biochemistry by A.V.S.S. Rama Rao. UBS Publishers & Distributors Pvt. Ltd.



6.4 Entrepreneurship Development and Communication Skills [EXT 321]

2 (1+1)

Theory:

Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Globalisation and the emerging business / entrepreneurial environment. Concept of entrepreneurship; entrepreneurial and managerial characteristics; managing of an enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programs; SWOT analysis, Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs) / SSIs. Export and Import Policies relevant to agriculture sector. Venture capital. Contract farming and joint ventures, public-private partnerships. Overview of agri inputs industry. Characteristics of Indian agricultural processing and export industry. Social Responsibility of Business. Communication Skills: Structural and functional grammar; Meaning and process of (communication, verbal and non-verbal (communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precis writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

Practical:

1. Listening and note taking, writing skills, oral presentation skills;
2. field diary and lab record;
3. Indexing, footnote and bibliographic procedures.
4. Reading and comprehension of general and technical articles, precis writing, summarizing, abstracting;
5. Individual and group presentations.

**References:**

1. Khanka S.S. (1999). Entrepreneurial development. S.Chand and Company Limited New Delhi
2. Linda Pinson and Jerry Jinnett (1987). Anatomy of a business plan. Second edition, Enterprise-Dearborn publication, North wacker Drive, Chicago, Illinois 60606-1719
3. Robert T Hisrich and Michael P Peters (1995). Entrepreneurship starting. Developing and managing a new enterprise, third edition, Irwin Publishers, Chicago/London/Sydney
4. Vasant Desai (1997). Small Scale Industries and Entrepreneurship. Himalaya Publishing House, New Delhi

6.5 Field Crops- II (Rabi) [AGR 303]**3(2+1)****Theory:**

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops; Cereals: wheat, barley; Pulses: chickpea, lentil, peas, french bean; Oilseeds: rapeseed and mustard, sunflower, safflower and linseed; Sugar crops: sugarcane and sugarbeet, Medicinal and aromatic crops such as mentha, lemon grass, citronella, palma rosa, isabgol and posta; Commercial crops: potato and tobacco, Forage crops: berseem, lucerne and oat.

Practical:

1. Seed bed preparation and sowing of wheat, sugarcane and sunflower;
2. Calculations on seed rate;
3. Top dressing of nitrogen in wheat and study of fertilizer experiments on wheat and mustard;
4. Identification of weeds in wheat and grain legumes, application of herbicide and study of weed control experiments;
5. Morphological characteristics of wheat, sugarcane, chickpea and mustard;
6. Yield contributing characters of wheat;
7. Yield and quality analysis of sugarcane;
8. Crop distribution in the state and the region;



9. Important agronomic experiments of Rabi crops and visit to research stations related to Rabi crops.

References:

1. Hand book of Agriculture – ICAR publication
2. Field Crops – Y.M. Iyyer
3. Crop Production – B.M. Paugh
4. Text book of field crops – Rajendra Prasad
5. Krishi Vijay – RVSKVV. Publication

**6.6 Comprehension and Communication Skills in English [ENG 301]
(NC)****Theory:**

Comprehension: Text for comprehension, Current English for Colleges, By N.Krishnaswamy & T.Sriraman, Macmillan India Limited, Madras, 1995; War Minus shooting – The sporting spirit George Orwell (a) Reading Comprehension (b) Vocabulary – Synonyms – Antonyms – Often confused words and (c) Two exercises to help the students in the enrichment of vocabulary based on TOEFL and GRE and other competitive examinations. A Dilemma – A layman looks at science Raymond B. Fosdick (a) Reading Comprehension (b) Vocabulary – Homonyms and Homophones (c) Exercises on Figurative Language & Idiomatic Language (E.g.: dust and ashes, doorstep of doom, boundaries of knowledge, Apple of one's eye, in a fix etc). 5&6 You and Your English – Spoken English and Broken English G.B.Shaw (a) Reading Comprehension (b) Language study, Functional Grammar, Agreement of verb with subject. Written Skills: Mechanics of good letter, Effective business correspondence, Personal Correspondence, Preparation of Curriculum vitae and Job applications. The Style, Importance of professional writing –Choice of words and Phrases, precision, conciseness cliches, redundancy, jargon, foreign words, Precis writing and synopsis writing. Interviews, Types of interviews, purpose, different settings, as interviewer, interviewee, physical makeup and manners, appearance, poise, speech, self reliance, Evaluation process, Review or feedback.

**Practical:**

1. Listening Comprehension.
2. Listening to short talks, lectures, speeches (scientific, commercial and general in nature) Practical.
3. Listening to at least two tape recorded conversations aimed at testing the listening comprehension of students.
4. Communication: Spoken English, oral communication, importance stress and intonation.
5. Practical: Spoken English practice by using audiovisual aids, the essentials of good conversations, oral exercises in conversation practice (At the Doctor, at the Restaurant, at the Market Yard).
6. Oral Presentation of Reports.
7. Seminars and conferences, features of oral presentation, regulating speech, physical appearance, body language posture, eye contact, voice, audience, preparation of visual aids.
8. Practical: One presentation by individual on the given topic related to agriculture like W.T.O, Developing new technologies in Agriculture, Bio fertilizers etc.
9. Evaluation of a Presentation: evaluation sheet, other strategies to be considered for evaluating a presentation.
10. Practical: Mock evaluation of a presentation.
11. Dyadic communication, face to face conversation, Telephonic conversation, rate of speech, clarity of voice, speaking and listening politeness, telephone etiquette.
12. Practical: Practice of Telephonic conversation.
13. Reading skills, using Dictionary, reading dialogues, rapid reading, intensive reading, improving reading skills.
14. Meetings: purpose, procedure participation, chairmanship, physical arrangements, recording minutes of meeting.
15. Practice of Presentation by using power point and LCD projector.
16. Conducting Mock interviews – testing initiative, team spirit, leadership, intellectual ability – potential for development, memory, motivation, objectives, aptitude etc.



17. Group Discussions and Debates on current topics.
18. Review or Feed Back; Practical examination.

References:

1. Business correspondence and Report Writing, R.C.Sharma and Krishna Mohan, (1978). Tata Mc Grow Hill Publishing Company, New Delhi
2. Business communication, M.Balasubramanyam, (1985). Vani Educational Books Ansari Road, New Delhi
3. Telephoning in English B.Jean Naterop and Rod Revell 1997 Cambridge University Press, Cambridge
4. Business Reports in English, Jeremy Comfort, Rod Revell and Chris Stott (1984). Cambridge University Press, Cambridge
5. New International Business English, Leo Jones and Rechar Alexander (1996). Cambridge University Press, Cambridge
6. Modern Business correspondence, L.Garside, (1991). Pitman Publishing Limited, London
7. English conversation practice, Grant Taylor, (1975). Tata Mc Grow Hill Publishing Company, New Delhi
8. Spoken English, V.Sashikumar & P.V.Dhamija, (1997). Tata Mc Grow Hill Publishing Company, New Delhi
9. Developing Communication Skills, Krishna Mohan and Meera and Meera Banerjee (1990). Macmillan India Ltd
10. 1001 ways to improve your conversation and speeches, Herbet V Prochnow, Jaico Publishing House, New Delhi, (1982).

6.7 Environmental Science [BCH 302]**2 (1+1)**

Theory: Scope and importance of environmental studies. Natural resources: Renewable and non-renewable resources. Forest, Water, Food, energy and land resources. Ecosystems: Definition, concept, structure and functions. Producers, consumers and decomposers of an ecosystem. Energy flow in the ecosystem. Types of ecosystems. Bio-diversity: Definition, classification, threats to biodiversity and its conservation. Environmental pollution: Causes, effects and control of air, water, soil, thermal, noise and marine pollution. Causes, effects



and management of soil nuclear hazards and industrial wastes. Disaster management, Floods, earthquakes, cyclones and land slides. Social issues and the environment, unsustainable to sustainable development. The Environment Protection Act, The Air Act, The water Act, The Wildlife Protection Act and Forest Conservation Act. Woman and child welfare, HIV/AIDS and Role of information technology on environment and human health.

Practical:

1. Collection, processing and storage of effluent samples;
2. Determination of Bio- Chemical oxygen demand (BOD) in effluent sample;
3. Determination of chemical oxygen demand (COD) in effluent sample;
4. Estimation of dissolved oxygen in effluent samples;
5. Determination of sound level by using sound level meter;
6. Estimation of respirable and non respirable dust in the air by using portable dust sampler;
7. Determination of total dissolved solids (TDS) in effluent samples;
8. Estimation of species abundance of plants;
9. Estimation of nitrate contamination in ground water;
10. Analysis of temporary and total hardness of water sample by titration;
11. Estimation of pesticide contamination in Agro-Ecosystem;
12. Visit to Social Service Organisation / Environmental Education Centre;
13. Crop adaptation to environmental variables, soils conditions;
14. Study of transpiration and water balance in plants;
15. Visit to a local polluted site.
16. Observations and remedial measures;
17. Assessment of chlorophyll content of fresh water / sea water ecosystem.

References:

1. Introduction to Environmental technology by Ann Boyce. John Wiley and sons.
2. Environmental Pollution and Environmental management by P. Dwivedi, ISBN.

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$$2(1+1)$$

Weeds Introduction, harmful and beneficial effects, classification, propagation and dissemination; Weed biology and ecology, crop weed association, crop weed competition and allelopathy; Concepts of weed prevention, control and eradication; Methods of weed control: physical, cultural, chemical and biological methods. Integrated weed management; Herbicides: advantages and limitation of herbicide usage in India, Herbicide classification, formulations, methods of application; Introduction to Adjuvants and their use in herbicides; Introduction to selectivity of herbicides; Compatibility of herbicides with other agrochemicals; Weed management in major field and horticultural crops, shift of weed flora in cropping systems, aquatic and problematic weeds and their control.

1. Identification of weeds;
2. Survey of weeds in crop fields and other habitats;
3. Preparation of herbarium of weeds;
4. Calculations on weed control efficiency and weed index;
5. Herbicide label information;
6. Computation of herbicide doses;
7. Study of herbicide application equipment and calibration;
8. Demonstration of methods of herbicide application;
9. Preparation of list of commonly available herbicides;



10. Study of phytotoxicity symptoms of herbicides in different crops;
11. Biology of nut sedge, bermuda grass, parthenium and celosia;
12. Economics of weed control practices;
13. Tours and visits of problem areas.

References:

1. Weed science: Basics and Applications, (2008) – T.K. Das
2. A manual of Weed Control – M.L. Kewat and R.S. Sharma
3. Principles of WEED SCIENCE – V.S. Rao
4. Weed Management- U.S. Walia
5. Weed Management –Principles and practices – O.P. Gupta

6.9 Renewable Energy [AEG 301]**2 (1+1)****Theory:**

Energy sources, Introduction, Classification, Energy from Biomass, Types of biogas plants, constructional details, Biogas production and its utilization, Agricultural wastes, Principles of combustion, pyrolysis and gasification, Types of gasifiers, Producer gas and its utilization. Briquettes, Types of Briquetting machines, uses of Briquettes, Shredders. Solar energy, Solar flat plate and focussing plate collectors, Solar air heaters, Solar space heating and cooling, Solar energy applications / Solar energy gadgets, Solar cookers, Solar water heating systems, solar grain dryers, Solar Refrigeration system, Solar ponds, Solar photo voltaic systems, solar lantern, Solar street lights, solar fencing, Solar pumping systems. Wind energy, Types of wind mills, Constructional details & application of wind mills. Liquid Bio fuels, Bio diesel and Ethanol from agricultural produce, its production & uses.

Practical:

1. Constructional details of KVIC & Janata type biogas plants;
2. Constructional details of Deen Bandhu type biogas plants;
3. Field visit to biogas plants;



4. Constructional details of different types of gasifiers;
5. Testing of gasifiers;
6. Briquette preparation from biomass;
7. To study and find the efficiency of solar cooker;
8. To study and find the performance of a solar still;
9. To study and find the performance of a solar dryers;
10. Study and working of solar photovoltaic pumping system;
11. Study and performance evaluation of domestic solar water heater;
12. Study and performance evaluation of solar lantern;
13. Study and performance evaluation of solar street light;
14. To study the performance of different types of wind mills;
15. Field visit to wind mills;
16. To study the processing of Bio-diesel production from Jatropha.

References:

1. Biotechnology and other Alternate Technology, Chakravarthy A (1989). Oxford and IBH Publishing Co. Ltd. New Delhi
2. Renewable Energy Sources and Conversion Technology, Bansal N K. *et al* (1990). Tata McGraw Hill publishing Co. Ltd., New Delhi.
3. Solar Energy Utilization, Rai G.D (1984). Khanna Publishers, New Delhi
4. Solar Energy, Sukatme SP (1985). Tata McGraw Hill publishing Co. Ltd., New Delhi.
5. Non Conventional Energy Sources, Rai GD (1996). Khanna publishers, New Delhi.
6. Biomass Briquetting and utilization, Srivastava et.al. (1995). Jain Brothers New Delhi 110 005